

1. Discuss the direct quality cost categories, for each one discuss the subcategories (full description)
2. a - Give the objectives of quality costs
b - Give and describe the direct operating quality costs chart.
c - Give and describe the direct and indirect quality costs chart.
3. Control Charts for \bar{X} & R are to be established for the data given in table (1). Determine the trial central and control limits. Assume that out-of-control points have assignable causes. Calculate the revised limits and central line. (steps - formulas - calculations)
 - Repeat the solution for \bar{X} & S charts and comment.
4. Special plastics, Inc., has been making the blanks for credit cards for a number of years, they use P chart to keep track for the number of nonconforming cards that are created each time a batch of blank cards is run. Use the data in table (2) to create a fraction nonconforming (P) chart.

Revising the P chart:

A new equipment has been installed and is currently being used to improve the printing and color consistency. Since the new equipment has been installed, the number of nonconforming cards has decreased (see the P chart you just have drawn). Calculate the new central line and control limits using the data following the process changes; that is points 1 through 12 should be removed or discarded. Revise the central line and control limits.

5. (a) In variable sample size P chart, n_{ave} is used to minimize the effect of variable sample size, discuss the idea and the different cases resulted.
(b) Given the data in table (3) construct P chart for variable sample size & revise.
(c) Use the same data in table (3) construct P chart using n_{ave} idea.

Table 1 Clutch Plate Thickness: Sums and Averages

Subgroup 1	0.0625	0.0626	0.0624	0.0625	0.0627
Subgroup 2	0.0624	0.0623	0.0624	0.0626	0.0625
Subgroup 3	0.0622	0.0625	0.0623	0.0625	0.0626
Subgroup 4	0.0624	0.0623	0.0620	0.0623	0.0624
Subgroup 5	0.0621	0.0621	0.0622	0.0625	0.0624
Subgroup 6	0.0628	0.0626	0.0625	0.0626	0.0627
Subgroup 7	0.0624	0.0627	0.0625	0.0624	0.0626
Subgroup 8	0.0624	0.0625	0.0625	0.0626	0.0626
Subgroup 9	0.0627	0.0628	0.0626	0.0625	0.0627
Subgroup 10	0.0625	0.0626	0.0628	0.0626	0.0627
Subgroup 11	0.0625	0.0624	0.0626	0.0626	0.0626
Subgroup 12	0.0630	0.0628	0.0627	0.0625	0.0627
Subgroup 13	0.0627	0.0626	0.0628	0.0627	0.0626
Subgroup 14	0.0626	0.0626	0.0625	0.0626	0.0627
Subgroup 15	0.0628	0.0627	0.0626	0.0625	0.0626
Subgroup 16	0.0625	0.0626	0.0625	0.0628	0.0627
Subgroup 17	0.0624	0.0626	0.0624	0.0625	0.0627
Subgroup 18	0.0628	0.0627	0.0628	0.0626	0.0630
Subgroup 19	0.0627	0.0626	0.0628	0.0625	0.0627
Subgroup 20	0.0626	0.0625	0.0626	0.0625	0.0627

Table 2

Subgroup Number	n	np
1	500	20
2	500	21
3	500	19
4	500	15
5	500	18
6	500	20
7	500	19
8	500	28
9	500	17
10	500	20
11	500	19
12	500	18
13	500	10
14	500	11
15	500	10
16	500	9
17	500	10
18	500	11
19	500	9
20	500	8
	10,000	312

Table 3

Subgroup Number	n	np
1	120	0
2	100	1
3	105	6
4	110	1
5	95	1
6	110	2
7	115	0
8	110	1
9	100	0
10	100	2
11	110	1
12	105	3
13	110	0
14	115	2
15	120	7
16	110	2
17	105	1
18	110	2
19	105	0
20	110	1
21	115	8
22	105	7

Factors for Computing Central Lines and 3σ Control Limits for \bar{X} , s, and R Charts

Subgroup	Chart for Averages					Chart for Ranges					Chart for Standard Deviations									
	Factors for Control Limits			Factor for Central Line	Factors for Control Limits			Factor for Central Line	Factors for Control Limits											
	A	A ₂	A ₃	d ₂	d ₁	D ₁	D ₂	D ₃	D ₄	c ₄	B ₃	B ₄	B ₅	B ₆						
Subgroup 21	0.0627	0.0626	0.0628	0.0625	0.0627															
Subgroup 22	0.0625	0.0626	0.0628	0.0625	0.0627															
Subgroup 23	0.0628	0.0626	0.0627	0.0630	0.0627															
Subgroup 24	0.0625	0.0631	0.0630	0.0628	0.0627															
Subgroup 25	0.0627	0.0630	0.0631	0.0628	0.0627															
Subgroup 26	0.0630	0.0628	0.0629	0.0628	0.0627	2	2.121	1.880	2.659	1.128	0.853	0	3.686	0	3.267	0.7979	0	3.267	0	2.606
Subgroup 27	0.0630	0.0628	0.0631	0.0628	0.0627	3	1.732	1.023	1.954	1.693	0.888	0	4.358	0	2.574	0.8862	0	2.568	0	2.276
Subgroup 28	0.0632	0.0632	0.0628	0.0631	0.0630	4	1.500	0.729	1.628	2.059	0.880	0	4.698	0	2.282	0.9213	0	2.266	0	2.088
Subgroup 29	0.0630	0.0628	0.0631	0.0628	0.0627	5	1.342	0.577	1.427	2.326	0.864	0	4.918	0	2.114	0.9400	0	2.089	0	1.964
Subgroup 30	0.0632	0.0632	0.0628	0.0631	0.0630	6	1.225	0.483	1.287	2.534	0.848	0	5.078	0	2.004	0.9515	0.030	1.970	0.029	1.874
Subgroup 31	0.0630	0.0628	0.0631	0.0632	0.0631	7	1.134	0.419	1.182	2.704	0.833	0.204	5.204	0.076	1.924	0.9594	0.118	1.882	0.113	1.806
Subgroup 32	0.0632	0.0631	0.0630	0.0628	0.0628	8	1.061	0.373	1.099	2.847	0.820	0.388	5.306	0.136	1.864	0.9650	0.185	1.815	0.179	1.751
Subgroup 33						9	1.000	0.337	1.032	2.970	0.808	0.547	5.393	0.184	1.816	0.9693	0.239	1.761	0.232	1.707
Subgroup 34						10	0.949	0.308	0.975	3.078	0.797	0.687	5.469	0.223	1.777	0.9727	0.284	1.716	0.276	1.669
Subgroup 35						11	0.905	0.285	0.927	3.173	0.787	0.811	5.535	0.256	1.744	0.9754	0.321	1.679	0.313	1.637
Subgroup 36						12	0.866	0.266	0.886	3.258	0.778	0.922	5.594	0.283	1.717	0.9776	0.354	1.646	0.346	1.610
Subgroup 37						13	0.832	0.249	0.850	3.336	0.770	1.025	5.647	0.307	1.693	0.9794	0.382	1.618	0.374	1.585
Subgroup 38						14	0.802	0.235	0.817	3.407	0.763	1.118	5.696	0.328	1.672	0.9810	0.406	1.594	0.399	1.563
Subgroup 39						15	0.775	0.223	0.789	3.472	0.756	1.203	5.741	0.347	1.653	0.9823	0.428	1.572	0.421	1.544
Subgroup 40						16	0.750	0.212	0.763	3.532	0.750	1.282	5.782	0.363	1.637	0.9835	0.448	1.552	0.440	1.526
Subgroup 41						17	0.728	0.203	0.739	3.588	0.744	1.356	5.820	0.378	1.622	0.9845	0.466	1.534	0.458	1.511
Subgroup 42						18	0.707	0.194	0.718	3.640	0.739	1.424	5.856	0.391	1.608	0.9854	0.482	1.518	0.475	1.496
Subgroup 43						19	0.688	0.187	0.698	3.689	0.734	1.487	5.891	0.403	1.597	0.9862	0.497	1.503	0.490	1.483
Subgroup 44						20	0.671	0.180	0.680	3.735	0.729	1.549	5.921	0.415	1.585	0.9869	0.510	1.490	0.504	1.470

1%

Compound Interest Factors

1%

n	SINGLE PAYMENT		UNIFORM PAYMENT SERIES				GRADIENT SERIES	
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth
	Find F Given P F/P	Find P Given F P/F	Find A Given F A/F	Find A Given P A/P	Find F Given A F/A	Find P Given A P/A	Find A Given G A/G	Find P Given G P/G
1	1.010	.9901	1.0000	1.0100	1.000	.990	0	0
2	1.020	.9803	.4975	.5075	2.010	1.970	.498	.980
3	1.030	.9706	.3300	.3400	3.030	2.941	.993	2.921
4	1.041	.9610	.2463	.2563	4.060	3.902	1.488	5.804
5	1.051	.9515	.1960	.2060	5.101	4.853	1.980	9.610
6	1.062	.9420	.1625	.1725	6.152	5.795	2.471	14.321
7	1.072	.9327	.1386	.1486	7.214	6.728	2.960	19.917
8	1.083	.9235	.1207	.1307	8.286	7.652	3.448	26.381
9	1.094	.9143	.1067	.1167	9.369	8.566	3.934	33.696
10	1.105	.9053	.0956	.1056	10.462	9.471	4.418	41.843
11	1.116	.8963	.0865	.0965	11.567	10.368	4.901	50.807
12	1.127	.8874	.0788	.0888	12.683	11.255	5.381	60.569
13	1.138	.8787	.0724	.0824	13.809	12.134	5.861	71.113
14	1.149	.8700	.0669	.0769	14.947	13.004	6.338	82.422
15	1.161	.8613	.0621	.0721	16.097	13.865	6.814	94.481
16	1.173	.8528	.0579	.0679	17.258	14.718	7.289	107.273
17	1.184	.8444	.0543	.0643	18.430	15.561	7.761	120.783
18	1.196	.8360	.0510	.0610	19.615	16.398	8.232	134.996
19	1.208	.8277	.0481	.0581	20.811	17.226	8.702	149.895
20	1.220	.8195	.0454	.0554	22.019	18.046	9.169	165.466
21	1.232	.8114	.0430	.0530	23.239	18.857	9.635	181.695
22	1.245	.8034	.0409	.0509	24.472	19.660	10.100	198.566
23	1.257	.7954	.0389	.0489	25.716	20.463	10.563	216.066
24	1.270	.7876	.0371	.0471	26.973	21.243	11.024	234.180
25	1.282	.7798	.0354	.0454	28.243	22.023	11.483	252.894
26	1.295	.7720	.0339	.0439	29.526	22.795	11.941	272.196
27	1.308	.7644	.0324	.0424	30.821	23.560	12.397	292.070
28	1.321	.7568	.0311	.0411	32.129	24.316	12.852	312.505
29	1.335	.7493	.0299	.0399	33.450	25.066	13.304	333.486
30	1.348	.7419	.0287	.0387	34.785	25.808	13.756	355.002
36	1.431	.6989	.0232	.0332	43.077	30.108	16.428	494.621
40	1.489	.6717	.0205	.0305	48.886	32.835	18.178	596.856
48	1.612	.6203	.0163	.0263	61.223	37.974	21.598	820.146
50	1.645	.6080	.0155	.0255	64.463	39.196	22.436	879.418
52	1.678	.5961	.0148	.0248	67.769	40.394	23.269	939.918
60	1.817	.5504	.0122	.0222	81.670	44.955	26.533	1192.806
70	2.007	.4983	.0099	.0199	100.676	50.169	30.470	1528.647
72	2.047	.4885	.0096	.0196	104.710	51.150	31.239	1597.867
80	2.217	.4511	.0082	.0182	121.672	54.888	34.249	1879.877
84	2.307	.4335	.0077	.0177	130.672	56.648	35.717	2023.315
90	2.449	.4084	.0069	.0169	144.863	59.161	37.872	2240.567
96	2.599	.3847	.0063	.0163	159.927	61.528	39.973	2459.430
100	2.705	.3697	.0059	.0159	170.481	63.029	41.343	2605.776
104	2.815	.3553	.0055	.0155	181.464	64.471	42.688	2752.182
120	3.300	.3030	.0043	.0143	230.039	69.701	47.835	3334.115
240	10.893	.0918	.0010	.0110	989.255	90.819	75.739	6878.602
360	35.950	.0278	.0003	.0103	3494.694	97.218	89.699	8720.432
480	118.648	.0084	.0001	.0101	11764.773	99.157	95.920	9511.158

5%

Compound Interest Factors

5%

n	SINGLE PAYMENT		UNIFORM PAYMENT SERIES				GRADIENT SERIES	
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth
	Find F Given P F/P	Find P Given F P/F	Find A Given F A/F	Find A Given P A/P	Find F Given A F/A	Find P Given A P/A	Find A Given G A/G	Find P Given G P/G
1	1.050	.9524	1.0000	1.0500	1.000	.952	0	0
2	1.102	.9070	.4878	.5378	2.050	1.859	.488	.907
3	1.158	.8638	.3172	.3672	3.152	2.723	.967	2.635
4	1.216	.8227	.2320	.2820	4.310	3.546	1.439	5.103
5	1.276	.7835	.1810	.2310	5.526	4.329	1.903	8.237
6	1.340	.7462	.1470	.1970	6.802	5.076	2.358	11.968
7	1.407	.7107	.1228	.1728	8.142	5.786	2.805	16.232
8	1.477	.6768	.1047	.1547	9.545	6.463	3.245	20.970
9	1.551	.6446	.0907	.1407	11.027	7.108	3.676	26.127
10	1.629	.6139	.0795	.1295	12.578	7.722	4.099	31.652
11	1.710	.5847	.0704	.1204	14.207	8.306	4.514	37.499
12	1.796	.5568	.0628	.1128	15.917	8.863	4.922	43.624
13	1.886	.5303	.0565	.1065	17.712	9.394	5.322	49.988
14	1.980	.5051	.0510	.1010	19.595	9.899	5.713	56.554
15	2.079	.4810	.0463	.0963	21.575	10.380	6.097	63.288
16	2.183	.4581	.0423	.0923	23.657	10.838	6.474	70.160
17	2.292	.4363	.0387	.0887	25.840	11.274	6.842	77.140
18	2.407	.4155	.0355	.0855	28.132	11.690	7.203	84.204
19	2.527	.3957	.0327	.0827	30.535	12.085	7.557	91.328
20	2.653	.3769	.0302	.0802	33.066	12.462	7.903	98.488
21	2.786	.3589	.0280	.0780	35.715	12.821	8.242	105.667
22	2.925	.3418	.0260	.0760	38.505	13.163	8.573	112.846
23	3.072	.3256	.0241	.0741	41.430	13.489	8.897	120.009
24	3.225	.3101	.0225	.0725	44.502	13.799	9.214	127.140
25	3.386	.2953	.0210	.0710	47.727	14.094	9.524	134.228
26	3.556	.2812	.0196	.0696	51.113	14.375	9.827	141.259
27	3.733	.2678	.0183	.0683	54.669	14.643	10.122	148.223
28	3.920	.2551	.0171	.0671	58.405	14.898	10.411	155.110
29	4.116	.2429	.0160	.0660	62.322	15.141	10.694	161.913
30	4.322	.2314	.0151	.0651	66.435	15.372	10.969	168.623
31	4.538	.2204	.0141	.0641	70.761	15.593	11.238	175.233
32	4.765	.2099	.0133	.0633	75.295	15.803	11.501	181.739
33	5.003	.1999	.0125	.0625	80.064	16.003	11.757	188.135
34	5.253	.1904	.0118	.0618	85.067	16.193	12.006	194.417
35	5.516	.1813	.0111	.0611	90.320	16.374	12.250	200.581
40	7.040	.1420	.0083	.0583	120.800	17.159	13.377	229.545
45	8.985	.1113	.0063	.0563	159.700	17.774	14.364	255.315
50	11.467	.0872	.0048	.0548	209.348	18.256	15.223	277.915
55	14.636	.0683	.0037	.0537	272.713	18.633	15.966	297.510
60	18.679	.0535	.0028	.0528	353.584	18.929	16.606	314.343
65	23.840	.0419	.0022	.0522	456.796	19.161	17.154	328.691
70	30.426	.0329	.0017	.0517	588.529	19.343	17.621	340.841
75	38.833	.0258	.0013	.0513	756.654	19.485	18.018	351.072
80	49.561	.0202	.0010	.0510	971.229	19.596	18.353	359.646
85	63.254	.0158	.0008	.0508	1245.087	19.684	18.635	366.801
90	80.730	.0124	.0006	.0506	1594.607	19.752	18.871	372.749
95	103.035	.0097	.0005	.0505	2040.694	19.806	19.069	377.677
100	131.501	.0076	.0004	.0504	2610.025	19.848	19.234	381.749

10%

Compound Interest Factors

10% 8%

Compound Interest Factors

8%

n	SINGLE PAYMENT		UNIFORM PAYMENT SERIES				GRADIENT SERIES	
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth
	Find F Given P FIP	Find P Given P PIF	Find A Given F AIF	Find A Given P AIP	Find F Given A FIA	Find P Given A PIA	Find A Given G AIG	Find P Given G PIG
1	1.100	.9091	1.0000	1.0000	1.000	.909	0	0
2	1.210	.8264	.4762	.5762	2.100	1.736	.476	.826
3	1.331	.7513	.3021	.4021	3.310	2.487	.937	2.329
4	1.464	.6830	.2155	.3155	4.641	3.170	1.381	4.378
5	1.611	.6209	.1538	.2638	6.105	3.791	1.810	6.862
6	1.772	.5645	.1096	.2296	7.716	4.355	2.224	9.684
7	1.949	.5132	.0754	.2054	9.487	4.868	2.622	12.763
8	2.144	.4665	.0574	.1874	11.436	5.335	3.004	16.029
9	2.358	.4241	.0436	.1736	13.579	5.759	3.372	19.421
10	2.594	.3855	.0327	.1627	15.937	6.145	3.725	22.891
11	2.853	.3505	.0240	.1540	18.531	6.495	4.064	26.396
12	3.138	.3186	.0168	.1468	21.384	6.814	4.388	29.901
13	3.452	.2897	.0108	.1408	24.523	7.103	4.699	33.377
14	3.797	.2633	.0057	.1357	27.975	7.367	4.996	36.800
15	4.177	.2394	.0015	.1315	31.772	7.606	5.279	40.152
16	4.595	.2176	.0008	.1278	35.950	7.824	5.549	43.416
17	5.054	.1978	.0004	.1247	40.545	8.022	5.807	46.582
18	5.560	.1799	.0002	.1219	45.599	8.201	6.053	49.640
19	6.116	.1635	.0001	.1195	51.159	8.365	6.286	52.583
20	6.727	.1486	.0000	.1175	57.275	8.514	6.508	55.407
21	7.400	.1351	.0000	.1156	64.002	8.649	6.719	58.110
22	8.140	.1228	.0000	.1140	71.403	8.772	6.919	60.689
23	8.954	.1117	.0000	.1126	79.543	8.883	7.108	63.146
24	9.850	.1015	.0000	.1113	88.497	8.985	7.288	65.481
25	10.835	.0923	.0000	.1102	98.347	9.077	7.458	67.696
26	11.918	.0839	.0000	.1092	109.182	9.161	7.619	69.794
27	13.110	.0763	.0000	.1083	121.100	9.237	7.770	71.777
28	14.421	.0693	.0000	.1075	134.210	9.307	7.914	73.650
29	15.863	.0630	.0000	.1067	148.631	9.370	8.049	75.415
30	17.449	.0573	.0000	.1061	164.494	9.427	8.176	77.077
31	19.194	.0521	.0000	.1055	181.943	9.479	8.296	78.640
32	21.114	.0474	.0000	.1050	201.138	9.526	8.409	80.108
33	23.225	.0431	.0000	.1045	222.252	9.569	8.515	81.486
34	25.548	.0391	.0000	.1041	245.477	9.609	8.615	82.777
35	28.102	.0356	.0000	.1037	271.024	9.644	8.709	83.987
40	45.259	.0221	.0000	.1023	442.593	9.779	9.096	88.953
45	72.890	.0137	.0000	.1014	718.905	9.863	9.374	92.454
50	117.391	.0085	.0000	.1009	1163.909	9.915	9.570	94.889
55	189.059	.0053	.0000	.1005	1880.591	9.947	9.708	96.562
60	304.482	.0033	.0000	.1003	3034.816	9.967	9.802	97.701
65	490.371	.0020	.0000	.1002	4893.707	9.980	9.867	98.471
70	789.747	.0013	.0000	.1001	7887.470	9.987	9.911	98.987
75	1271.895	.0008	.0000	.1001	12708.954	9.992	9.941	99.332
80	2048.400	.0005	.0000	.1000	20474.002	9.995	9.961	99.561
85	3298.969	.0003	.0000	.1000	32979.690	9.997	9.974	99.712
90	5313.023	.0002	.0000	.1000	53120.226	9.998	9.983	99.812
95	8556.676	.0001	.0000	.1000	85556.761	9.999	9.989	99.877
100	13780.612	.0001	.0000	.1000	137796.123	9.999	9.993	99.920

n	SINGLE PAYMENT		UNIFORM PAYMENT SERIES				GRADIENT SERIES	
	Compound Amount Factor	Present Worth Factor	Sinking Fund Factor	Capital Recovery Factor	Compound Amount Factor	Present Worth Factor	Gradient Uniform Series	Gradient Present Worth
	Find F Given P FIP	Find P Given P PIF	Find A Given F AIF	Find A Given P AIP	Find F Given A FIA	Find P Given A PIA	Find A Given G AIG	Find P Given G PIG
1	1.080	.9259	1.0000	1.0800	1.000	.926	0	0
2	1.166	.8573	.4808	.5608	2.080	1.783	.481	.857
3	1.260	.7938	.3080	.3880	3.246	2.577	.949	2.445
4	1.360	.7350	.2219	.3019	4.506	3.312	1.404	4.650
5	1.469	.6806	.1705	.2505	5.867	3.993	1.846	7.372
6	1.587	.6302	.1363	.2163	7.336	4.623	2.276	10.523
7	1.714	.5835	.1121	.1921	8.923	5.206	2.694	14.024
8	1.851	.5403	.0940	.1740	10.637	5.747	3.099	17.806
9	1.999	.5002	.0801	.1601	12.488	6.247	3.491	21.808
10	2.159	.4632	.0690	.1490	14.487	6.710	3.871	25.977
11	2.332	.4289	.0601	.1401	16.645	7.139	4.240	30.266
12	2.518	.3971	.0527	.1327	18.977	7.536	4.596	34.634
13	2.720	.3677	.0465	.1265	21.495	7.904	4.940	39.046
14	2.937	.3405	.0413	.1213	24.215	8.244	5.273	43.472
15	3.172	.3152	.0368	.1168	27.152	8.559	5.594	47.886
16	3.426	.2919	.0330	.1130	30.324	8.851	5.905	52.264
17	3.700	.2703	.0296	.1096	33.750	9.122	6.204	56.588
18	3.996	.2502	.0267	.1067	37.450	9.372	6.492	60.843
19	4.316	.2317	.0241	.1041	41.446	9.604	6.770	65.013
20	4.661	.2145	.0219	.1019	45.762	9.818	7.037	69.090
21	5.034	.1987	.0198	.0998	50.423	10.017	7.294	73.063
22	5.437	.1839	.0180	.0980	55.457	10.201	7.541	76.926
23	5.871	.1703	.0164	.0964	60.893	10.371	7.779	80.673
24	6.341	.1577	.0150	.0950	66.765	10.529	8.007	84.300
25	6.848	.1460	.0137	.0937	73.106	10.675	8.225	87.804
26	7.396	.1352	.0125	.0925	79.954	10.810	8.435	91.184
27	7.988	.1252	.0114	.0914	87.351	10.935	8.636	94.439
28	8.627	.1159	.0105	.0905	95.339	11.051	8.829	97.569
29	9.317	.1073	.0096	.0896	103.966	11.158	9.013	100.574
30	10.063	.0994	.0088	.0888	113.283	11.258	9.190	103.456
31	10.868	.0920	.0081	.0881	123.346	11.350	9.358	106.216
32	11.737	.0852	.0075	.0875	134.214	11.435	9.520	108.857
33	12.676	.0789	.0069	.0869	145.951	11.514	9.674	111.382
34	13.690	.0730	.0063	.0863	158.627	11.587	9.821	113.792
35	14.785	.0676	.0058	.0858	172.317	11.655	9.961	116.092
40	21.725	.0460	.0039	.0839	259.057	11.925	10.570	126.042
45	31.920	.0313	.0026	.0826	386.506	12.108	11.045	133.733
50	46.902	.0213	.0017	.0817	573.770	12.233	11.411	139.593
55	68.914	.0145	.0012	.0812	848.923	12.319	11.690	144.006
60	101.257	.0099	.0008	.0808	1253.213	12.377	11.902	147.300
65	148.780	.0067	.0005	.0805	1847.248	12.416	12.060	149.739
70	218.606	.0046	.0004	.0804	2720.080	12.443	12.178	151.533
75	321.205	.0031	.0002	.0802	4002.557	12.461	12.266	152.845
80	471.955	.0021	.0002	.0802	5886.935	12.474	12.330	153.800
85	693.456	.0014	.0001	.0801	8655.706	12.482	12.377	154.492
90	1018.915	.0010	.0001	.0801	12723.939	12.488	12.412	154.993
95	1497.121	.0007	.0001	.0801	18701.507	12.492	12.437	155.352
100	2199.761	.0005	.0000	.0800	27484.516	12.494	12.455	155.611